one, indicate the direction of motion by referring to the source. Ferrel alone names his current with reference to its destination.

With singular inconsistency *motions* and *movements* are frequently denoted by adjectives showing whither the air goes, as will be seen by the following:

"Westerly motion" [toward the west].—FERREL.
"Easterly wind movements" [toward the east].—CLAYTON.
"Southeasterly movement of low" [toward southeast].—ABBE.
"Westerly motion" [toward the west].—WALDO.
"Westerly moving air" [toward the west].—BIGELOW.

But this usage is not uniform, for the opposite is seen in—

"Northeast motion" [from northeast].—ABERCROMBY.
"Southwest movement of upper air" [from southwest].—ABBE.

Components and *direction* give further differences:

"West component" [westward].—FERREL.
"The westerly component" [eastward].—CLAYTON.
"Westerly component" [westward].—BIGELOW.
"Southerly component" [northward].—CLAYTON.
"Wind deflected into a northeasterly direction" [toward northeast].—FERREL.
"The deflection from the general westerly direction" [eastward].—CLAYTON.

Drift furnishes further anomalies:

"Northerly drift" [from the north.]—CLAYTON.
"Direction of drift" [toward which it moves].—CLAYTON.
"Direction of currents" [from which they come].—CLAYTON.

Occasionally a *wind* is named from the direction toward which it blows.

"Easterly winds" [from the west].—WALDO.
"Westerly winds of the tropics."—A. J. HENRY.

Other peculiarities of wind nomenclature may be found.

"The return polar underflow [would cause] west-northwest winds until entering the latitudes of the trades their *course turned around to northeast*" [italics supplied].—DAVIS.

"Numerous studies of cyclonic circulation have shown that the higher currents blow more *to the right* [italics supplied] than the surface winds."—DAVIS.

"All across the temperate zone * * * we find the prevailing westerly winds; the surface members *blowing west-southwest*" [italics supplied].—DAVIS.

"Tropical trades blowing westerly."—BIGELOW.

"The trades which blow in a somewhat westerly direction."—LEY.

The foregoing examples are selected at random, not as being typical nor in criticism of any of the books from which they are taken, but simply as convenient illustrations, and for the purpose of calling attention to the fact that there is no uniform usage in naming wind currents, and to the desirability of having them described in such terms that no ambiguity can arise.

Currents of water commonly have their direction described by the points toward which they flow, and it would seem to be the better way to follow this usage with air currents when using, with reference thereto, the words *current*, *movement*, *motion*, *direction*, *drift*, etc., giving to the word *wind* alone a name referring to the source of motion.

NOTES BY THE EDITOR.

SUGGESTIONS TO OBSERVERS.

The Weather Bureau requires from its regular observers, as obligatory, a great variety of meteorological data, such as is liable to be called for at any moment by the business men and the citizens of the country, or by any scientist. The voluntary observers may be classified according to the object, the character and completeness of their reports. The greater number belong to that class whose main work consists in keeping a faithful record of the maximum and minimum temperatures, the total precipitation, and, possibly, the snowfall, the frosts, the hail, the wind, and all other matters that specially affect agricultural interests. Then comes the small class of those who keep a more complete record (sometimes even with self-registering instruments), adapted to determine all the important climatological elements of a given locality. Besides these there are other persons who interest themselves almost entirely in one narrow line of study, such as tornadoes, thunderstorms, auroras, wind velocity, the amount and rate of rainfall, the distribution of frost, the formation of frostwork, the photography and the altitudes and movements of clouds. These, and other subjects too numerous to mention, have each their special devotees, and those who are busied in such special work may be known as "special observers" independently of any activity as regular or voluntary observers. The pamphlets of instructions and the forms for the daily use of the regular and the voluntary observers, are, of course, necessarily reduced to the smallest possible bulk, and those who desire instructions, or rather suggestions, relative to special classes of observations must be provided for by special instructions and forms.

The attention of the reader, and especially of the section directors, is respectfully called to the current Table IX, formerly Table X, showing the frequency of thunderstorms and auroras for the month. In this table is given the number of stations (both regular and voluntary and special) that reported thunderstorms or auroras on any given day between midnight and midnight, of local standard meridian time. If, for instance, Arkansas having 51 stations sends 16 reports of thunderstorms on January 2, then we would naturally infer that thunderstorms occurred at about one-third of the stations, or over one-third of the State on that day. But this inference is liable to serious error for several reasons: (1) Some of the stations may have made no attempt to keep records of thunderstorms; (2) some stations may have recorded only those storms that passed over the station with rain, while others may have recorded any storm that passed within a mile, or within five miles, or even within sight of the station. In making up the annual summaries of thunderstorms and auroras for 1895 and 1896, the number of stations published from month to month, as reporting meteorological data in general, was replaced by the estimated number of those which probably sent a fairly complete record of thunderstorms and auroras. It is now desired to revise these numbers with greater exactness, and the Editor, with the permission of the Chief of Bureau, would earnestly request each voluntary observer to inscribe upon each monthly report some indications as to his rules for observing and recording both thunderstorms and auroras. The information particularly desired just now is the following:

Do you make a special and regular effort to complete your record, so that it shall show every thunderstorm and every aurora, or does it give only some of those that happened in your vicinity?

To those observers who aim to make a specially complete

record of thunderstorms and auroras it is recommended that the following items be observed and that a special record be kept in accordance therewith.

Electrical phenomena should be recorded under some one of the following eight classes:

1. Thunderstorm at the station. 2. Thunderstorm passed near, *i. e.*, within 3 miles of station. 3. Distant thunder. 4. Distant lightning, such as it may be presumed belongs to a distant thunderstorm. 5. Lightning observed near at hand without thunder. 6. Fireballs. 7. Luminous clouds. 8. Auroras.

Hailstorms, high winds, tornadoes, waterspouts, and other interesting phenomena may accompany a thunderstorm, but these are not to enter into the classification, the main object of the thunderstorm observers being to distinguish between thunder and lightning as such and the other phenomena. Under classes 1 and 2 the items to be observed are as follows: The time of hearing the first thunder (*a*) and the last thunder (*b*); the azimuthal bearing of the thundercloud when first seen (*c*) and last seen (*d*); the temperature of the air before the storm (*e*), the maximum and minimum temperature during the storm (*f*) and after the storm is over (*g*); the direction of the wind (*h*) before, (*i*) during, and (*j*) after the storm; time of beginning (*k*) and ending (*l*) of rain or hail; the maximum force of the wind (*m*) and its direction (*n*); total amount of precipitation (*o*) and the approximate amounts, separately, of the rain (*p*) and the hail (*q*); the occurrence (*r*) of tornadoes, waterspouts, and other interesting phenomena.

Under class 3, distant thunder, note the time of the first thunder (*a*) and the last thunder (*b*) and the directions (*c* and *d*) from which these respectively appeared to come.

Under class 4 note the times (*a* and *b*) and the directions (*c* and *d*) in which the lightning without thunder was first and last seen.

Under class 5 give a description, as detailed as possible, of all the circumstances attending these rare and interesting cases.

In the monthly summary of thunderstorms keep these five classes separate. When several thunderstorms occur in the same day, adopt the rule that thunderstorms separated by a period of time or a region of clear sky such as separates one cloud from another, are to be counted as separate storms.

Under class 6, fireballs, St. Elmo's lights, globular lightning require such special description of the attending circumstances as the observer may think appropriate. No special instruction has as yet been suggested.

Under class 7, luminous clouds on dark nights, when it does not seem likely that their illumination is due to fires or lights on the earth's surface, are frequently observed, and every case of the kind should be carefully noted, as these probably often result from a feeble and gentle electric discharge going on within the clouds. In the winter season similar electric glows have been observed from snow-covered hills and mountain peaks.

Under class 8, auroras should be looked for carefully all over the sky at one or more specific times during every night, *e. g.*, 6, 7, 8, 9, or 10 p. m., and the record should show whether, at those moments, the sky is (*a*) clear and the aurora absent, or (*b*) clear and the aurora visible, (*c*) cloudy enough to obscure an aurora, or (*d*) illuminated by moonlight or twilight enough to obscure an aurora. The monthly summary would, therefore, read, *e. g.*: 8 p. m. daily observation; five cloudy nights; ten clear nights with aurora and ten clear nights without an aurora; five nights when moonlight and twilight interfered. If a description of the aurora is attempted, it should include the apparent angular altitude and azimuth of the ends and summits of arches and beams, and of the center of the corona.

FALL OF AN AEROLITE IN ARIZONA.

Although in the progress of science, aerolites, meteoric stones, and shooting stars have been shown to be foreign bodies circulating through space, and generally circulating about the sun, and are, therefore, now studied by the astronomer rather than by the meteorologist, yet, on many accounts, they are of interest to the latter and should always be recorded by meteorological observers. The atmospheric phenomena that are within the bounds of observation from any one station are, ordinarily, not more than 25 miles distant, or considerably less than one-half of a degree of a great circle, so that 100,000 stations scattered at a distance of 50 miles apart over the whole earth's surface would be needed if we were to attempt to keep watch on all that happens in the atmosphere. If a complete record of shooting stars be desired a number of observers must be placed at each station in order that each may confine his attention to a small and definite portion of the sky, since no one person can keep the whole of it under supervision continuously. It follows that if a single observer records all the meteors seen in a small portion of the sky, this number must be multiplied by several hundred thousands, if not millions, in order to obtain an idea of the total number that enters the earth's atmosphere. Even if we confine our attention only to the largest shooting stars that descend as aerolites to the earth's surface it is evident that there may be 100,000 of these for the whole earth every year, since those actually recorded by observers must be a very small proportion of the whole number. It is plausible that by the action of innumerable meteors the earth receives a minute but steady increase in its mass, a steady addition to its heat and a steady diminution of its atmosphere by the consumption of its oxygen; but these quantities are not appreciable in meteorology. The principal interest that science finds in an aerolite consists in its mineralogical structure, its geological history, and its astronomical path, since it comes to us, as it were, from other worlds than ours. It is very desirable that every aerolite be promptly secured and preserved from destruction by being placed in some public museum, and that a notice of this fact be published in some scientific journal, so that the experts in the study of meteors may become aware of its existence and location.

The following account of a meteor in Arizona is communicated through W. T. Blythe, Observer and Section Director for the Weather Bureau at Phœnix, Ariz.:

TOMBSTONE, ARIZ., *February* 27, 1897.—On Wednesday afternoon, February 24, at 3.45 local time, or 2.45 Pacific time, sitting in the house I heard a noise resembling thunder, but yet not like it, lasting 15 or 20 seconds. I felt no vibration or movement of any kind. On inquiry in this town I find that a meteor fell near by; many say that they saw it, and many concur in saying that windows and doors rattled, etc. I am told that a piece of the meteor has fallen at St. David about 12 miles away, and I have written to see if I can secure the stone for the public.—*Henry M. Gee, Voluntary Observer.*

From a newspaper slip inclosed by Mr. Gee, we learn that the meteoric stone which fell near the ranch of J. N. Curtis, a short distance below St. David, was secured by the latter. It weighed 27 pounds, and had buried itself in the ground after plowing up the earth for a considerable distance. At Tombstone the broad white lines which marked the flight of the meteor from southwest to northeast, were distinctly seen after it passed. At Benson this trail remained visible for fully five minutes. At Tombstone the interval between its visible passage and the subsequent explosive sound was about 50 seconds. The noise as of a great explosion was heard, but especially at Dragoon and Benson. Tombstone is in latitude 31° 40′ N., and longitude 110° 5′ W. Benson is about 25 miles northwest of Tombstone. Dragoon station is about 25 miles north of Tombstone. St. David is about 15 miles northwest of Tombstone.